Before the DOCKET FILE COPY ORIGINAL

FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Federal-State Joint Board on Universal Service	)	CC Docket No. 96-45
	)	
	)	
Forward-Looking Mechanism for High Cost Support for Non-Rural LECs	)	CC Docket No. 97-160
	)	
	)	

COMMENTS OF WORLDCOM, INC.

WorldCom hereby submits its comments on Sections III.C.3. and III.C.4. of the Commission's Further Notice of Proposed Rule Making (FNPRM) in the above captioned proceeding. WorldCom is the fourth largest facilities-based interexchange carrier (IXC) in the United States. Following its recent merger with MFS Communications, WorldCom is now also the largest facilities-based competitive local exchange carrier (CLEC). As both an IXC and a CLEC, WorldCom has a vital interest in ensuring the fairness of any mechanism adopted to estimate the forward-looking economic costs that non-rural local exchange carriers (LECs) would incur to provide universal service in rural, insular and high cost areas. The cost models developed herein will be used to determine the dollar level of federal universal service support for carriers (whether incumbent or new entrant) who serve these areas. WorldCom is likely to be both a major contributor of that support and an eligible recipient for some of it based on the eligibility and portability rules adopted in the Commission's Order of May 8, 1997.[1]

WorldCom will address the "Issues for Comment" posed by the Commission in the sequence they are raised in the FNPRM.

[1] Federal State Joint Board on Universal Service, CC Docket No. 96-45 Report and Order, FCC 97-157 (rel. May 8, 1997).

I. Switching Platform Design – Mix of Host, Stand-alone, and Remote Switches

WorldCom agrees with the Commission's tentative conclusion that its selected costing "mechanism should include an algorithm that will place host switches in certain wire centers and remote switches in other wire centers." WorldCom also strongly suggests the Commission adopt an algorithm that includes a third alternative – place neither a host nor a remote switch in any wire center having fewer than 1,000 lines unless it is the largest wire center under common ownership within a 75 mile radius. In these very small wire-centers, WorldCom suggests the Commission adopt an algorithm that places digital loop carrier (DLC) either at the wire center or within the wire center area and that hauls the loops over extended fiber feeder to the closest (but not necessarily adjacent) wire center under common ownership that itself has either a remote or a host switch. WorldCom expects many loops in these very small wire centers already will utilize DLC and we believe both of the primary cost models currently being examined assume fiber based (but not necessarily SONET) interoffice facilities. Thus, the break-even analysis would need compare only the cost of additional DLC to the avoided fixed cost of creating another switching location. After the Commission examines the various proposed cost inputs for switches and DLC, it may determine a different break point – e.g., 1,500 lines minimum – is appropriate, but for now, it need only create an algorithm that permits three choices – host or remote or no switch.

The Commission asks parties "to demonstrate the most cost-effective deployment of switches in general and host-remote switching arrangements in particular." Obviously, a significant portion of any decision tree will depend on the specific switch costing algorithm that the Commission adopts. But, two general rules might include:

- DLC only in wire centers with fewer than 1,000 working lines; and,
- Remote switch only in wire centers with fewer than 7,000 working lines.

These guidelines should be constrained by the following:

- Remote (or DLC only) wire centers should be no more than 75 airline miles from the serving host switch; and,
- No carrier should be forced to home its remote or DLC on a host owned by another company, although such arrangements might significantly lower costs in rural areas.

The 1,000 and 7,000 line breaking points are based on an analysis of switching investment data recently released by the Commission.[2] WorldCom's analysis of this data is discussed below.

II. Switching Platform – Capacity Constraints

WorldCom agrees with the Commission's tentative conclusion that its algorithm should assign more than one switch to a wire center when certain capacity limits are exceeded. As the Commission notes, an office may be capacity constrained by lines, busy-hour call attempts (BHCA), busy-hour calling volume (BHCCS) and even occasionally by translation capacity needed for routing alternatives or vertical services. WorldCom supports use of the algorithms developed for this purpose in the Hatfield model.

III. Switching Platform – Switch Costs

The Commission observes that parties have experienced difficulty in developing switching investment costs. It solicits comments on how to remedy this problem. WorldCom has performed a brief analysis of the data gathered from LEC depreciation studies that the Commission recently released. This data conclusively demonstrates the remarkable benefits of both competition and evolving technology. Switch costs have dropped dramatically over the thirteen years since the breakup of the Bell System opened the local switching market to more robust competition. The data

[2] Spreadsheet of Digital Switching Data from Depreciation Rate Studies released by the Commission on August 4, 1997, DA 97-1663.

Summary of Linear Regression Analyses on
FCC Data from Switching Depreciation Studies

Attachment 1				
Chart	Title	Sample	Formula	R-squared
1	5ESS – 1993-1995	66	123.14x+2,000,000	0.5511
2	Small 5ESS – 1993-1995	18	123.86x+980,987	0.1456
3	Medium 5ESS – 1993-1995	26	68.609x+3,000,000	0.0741
4	5RSM – 1993-1995	53	130.49x+333,879	0.5810
5	DMS100 – 1993-1995	93	119.22x+550,205	0.5500
6	EWSD – 1993-1995	33	109.54x+420,278	0.8390
7	RAXE – 1993-1995	14	159.77x+231,478	0.8073
8	RSC – 1993-1995	83	113.85x+232,528	0.3442
9	Large 5ESS – 1993-1995	24	61.118x+7,000,000	0.0505

Attachment 2				
Chart	Title	Sample	Formula	R-squared
1	5ESS – 1983-1995	767	156.69x+3,000,000	0.5245
2	5ESS – 1994-1995	27	106.15x+1,000,000	0.7278
3	Very Sm 5ESS – 1983-1995	29	652.21x+264,892	0.6341
4	Small 5ESS – 1983-1995	282	234.18x+2,000,000	0.2396
5	Medium 5ESS – 1983-1995	337	185.88x+3,000,000	0.2155
6	Large 5ESS – 1983-1995	92	3.538x+10,000,000	0.00003
7	Total 5ESS – 1983-1995			
8	5RSM – 1983-1995	669	195.2x+241,338	0.7744
9	Very Lrg 5ESS – 1983-1995	27	16.367x+10,000,000	0.0027
10	EWSD – 1983-1995	88	103.1x+927,802	0.7888
11	DMS100 – 1983-1995	644	184.09x+2,000,000	0.5078
12	Very Sm DMS100 – 1983-1995	32	402.73x+200,161	0.2983
13	Small DMS100 – 1983-1995	286	203.71x+2,000,000	0.1891
14	Small DMS100 – 1983-1995	318	240.87x+1,000,000	0.3219
15	Medium DMS100 – 1983-1995	308	163.57x+3,000,000	0.1997

Where "x" is the number of lines as that term is defined in the FCC's Spreadsheet of Digital Switching Data (see Public Notice, DA 97-1663, released August 4, 1997)

also contains enough detail to demonstrate the most popular types of switches and to permit various regression analyses to estimate linear cost algorithms. The above chart summarizes two dozen such evaluations. Scatter diagrams for each run are included as Attachments 1 and 2. Each diagram includes a linear and a logrithmic regression attempting to fit the selected data points. All data is taken from FCC spreadsheet of depreciation records on digital switches.

WorldCom supports use of the 1993-1995 data as a reasonable proxy for forward looking switching costs. Although based on activity, it is both relatively recent and reflects actual rather than hypothetical results. We think it provides a useful compromise in an area where other reliable data seems scarce or non-existent. Based on this data, WorldCom recommends the Commission base its forward looking costs on the Nortel product line. An algorithm based on this data yields a switch price of $126.10 per line at 80,000 lines and $174.24 per line at 10,000 lines for a host or stand-alone switch and $147.07 to $346.38 per line at 7,000 and 1,000 lines respectively for a remote switch. These values compare favorably to the data reported in the FNPRM. At the large line size, Hatfield predicts $74 per line, RUS extrapolates to $139 and BCPM predicts $228.[3] At the small end, RUS predicts $157.75 per line at 4,000 lines. WorldCom's analysis predicts $171.98 for a remote and $256.77 for a host at that line size. WorldCom did not apply a cost deflator to reflect the continuing drop in switch costs.

The Commission proposes to adopt its staff analysis that is based on 1995 data and reflects the most recently available data. WorldCom concurs. The Commission should not use the BCM2 default values. Further, the Commission need not attempt to determine or include a different cost for growth lines. TELRIC assumes a scorched node replacement of the total switching capacity necessary at the time of the study including spare capacity for some future growth and maintenance.

[3] FNPRM, ¶ 128-129.

IV. Switching Platform – Percent Split between Port and Usage

WorldCom agrees with the concept (which also is included in the recent access restructure) that switch costs can be divided between port and usage costs. However, we do not have a data source to recommend to determine the split. Further, we do not understand what percent of local usage the Commission intends to support as part of universal service.

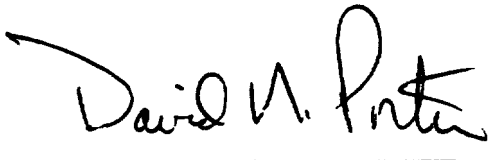
V. Interoffice Trunking, Signaling and Local Tandem Investment

WorldCom supports the Commission's tentative conclusion to use the platform design and input values for these functions as they are proposed by Hatfield.

VI. Conclusions

WorldCom supports the Commission's efforts to refine the switching cost elements in the evolving universal service cost models. Generally, we believe rural switching costs have been over-estimated and urban costs under-estimated. Either the algorithms proposed here or the algorithms proposed by Commission staff will help rectify those deficiencies.

Respectfully submitted,



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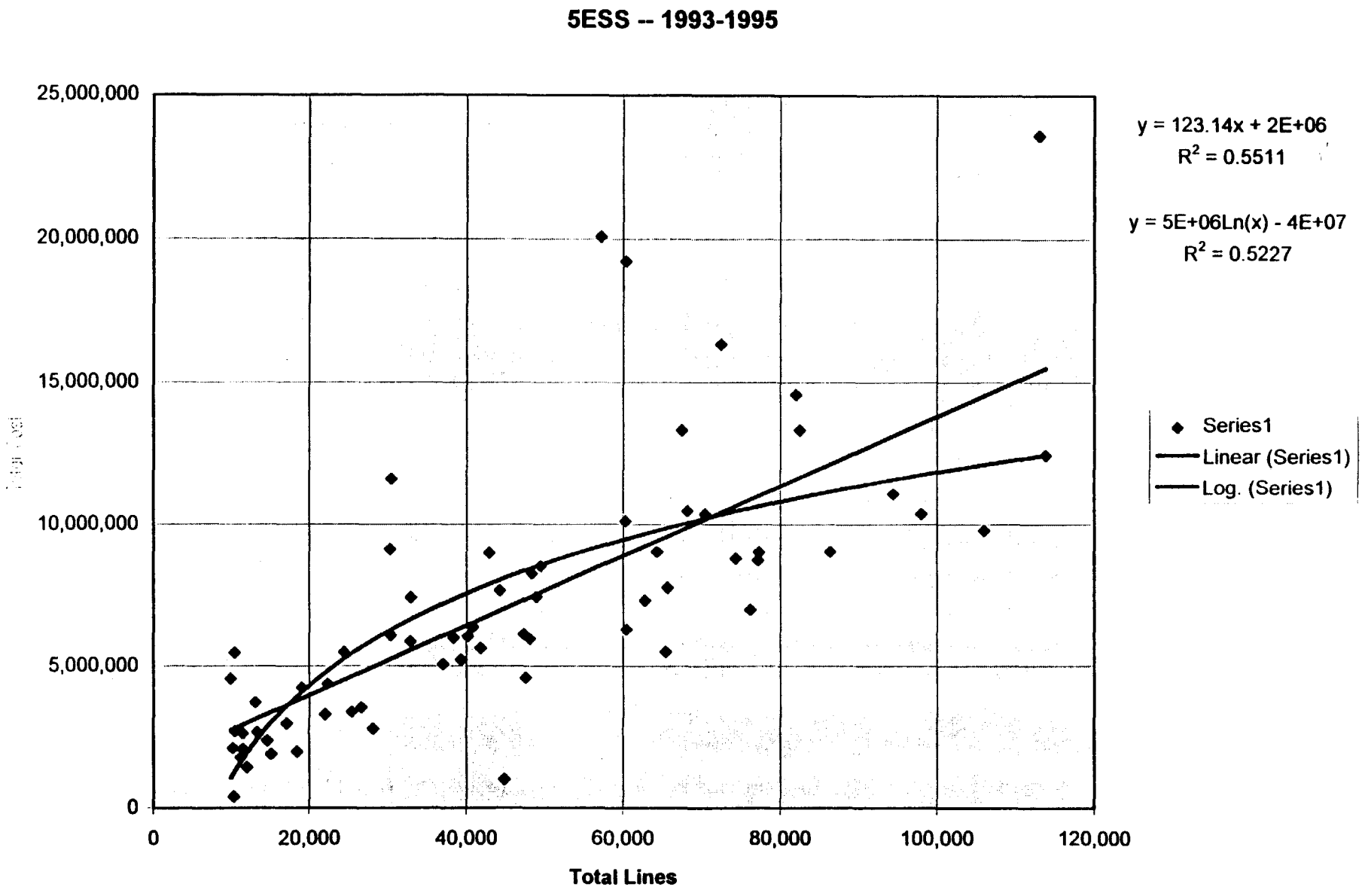
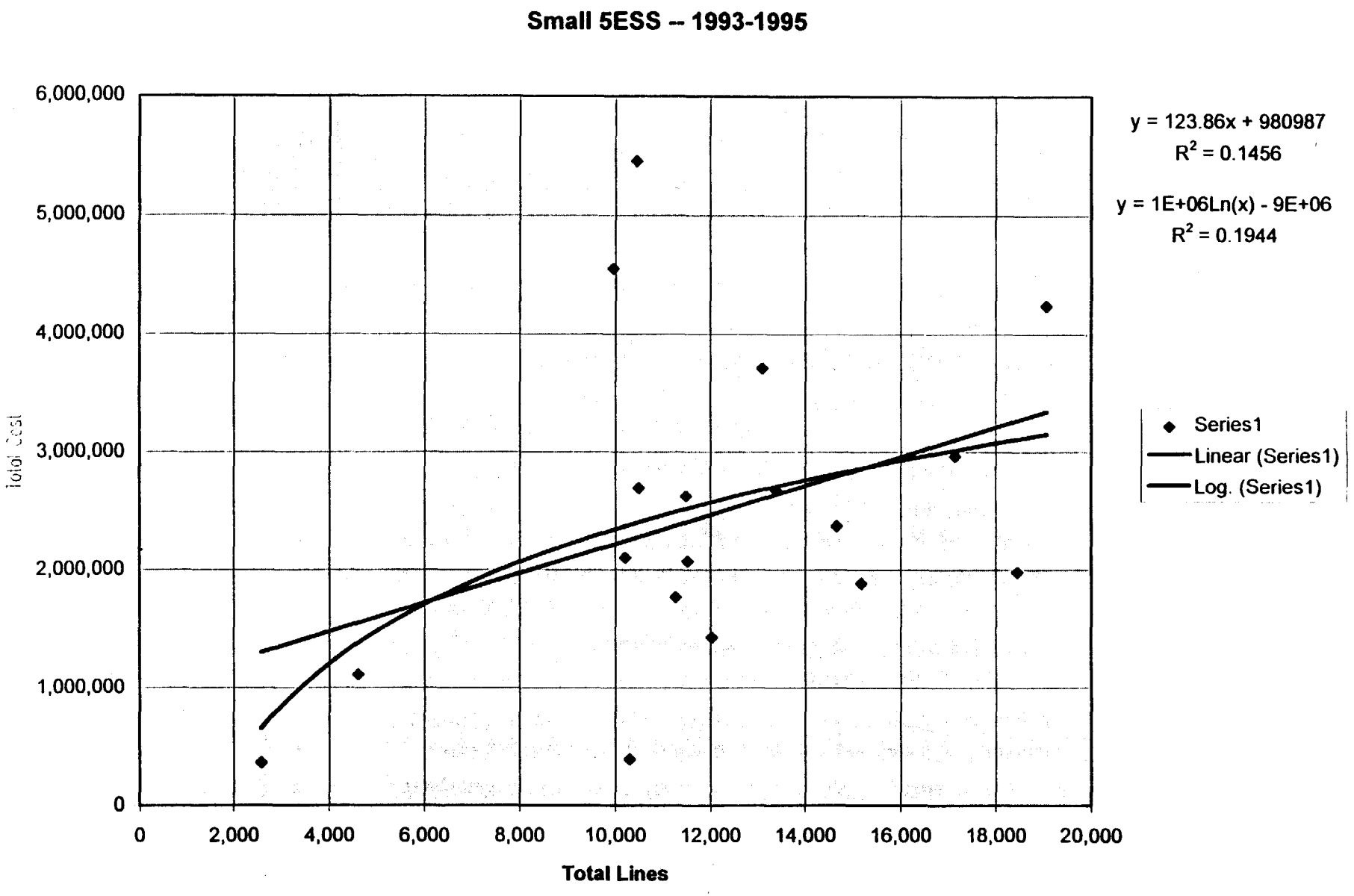
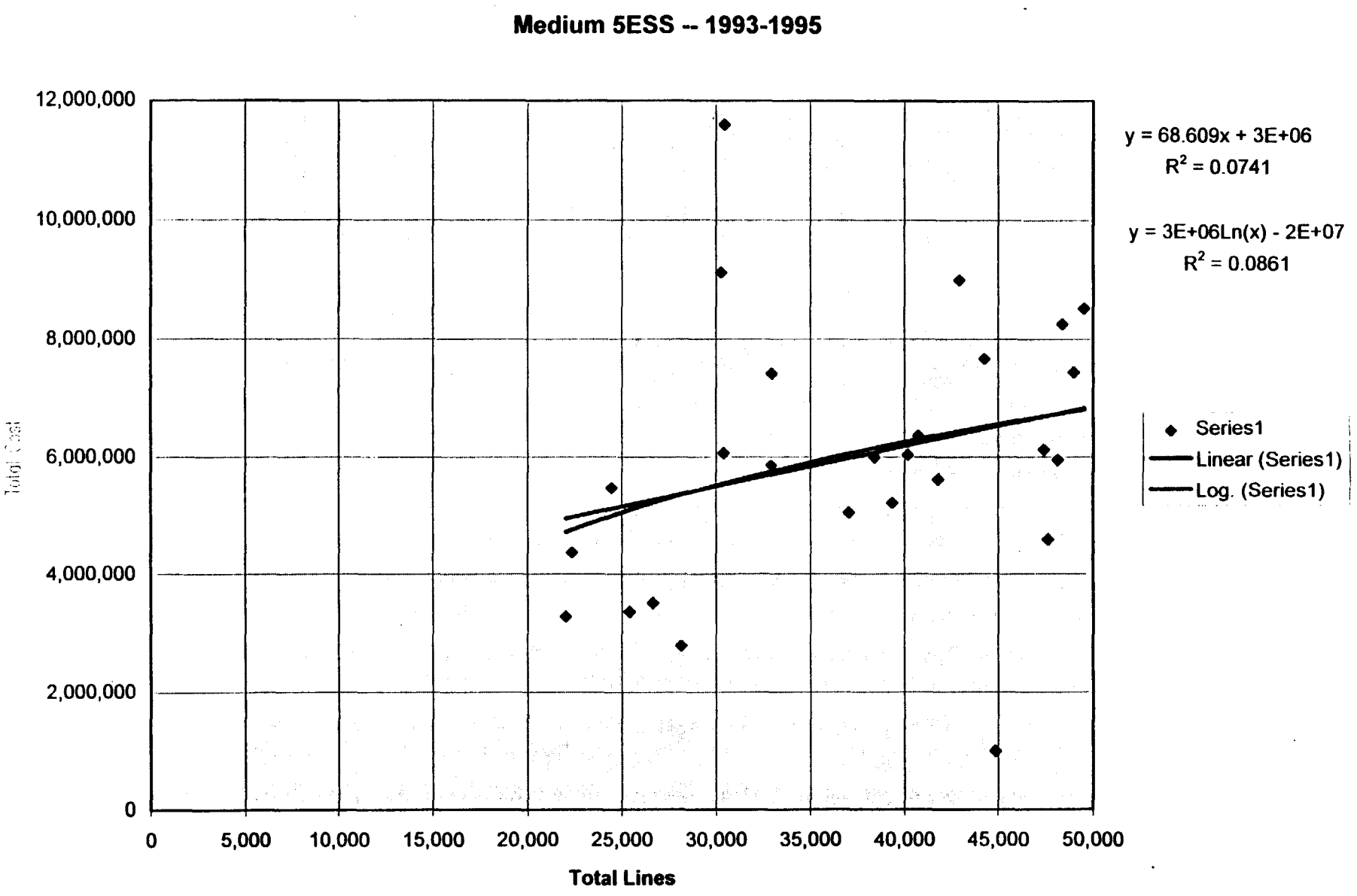
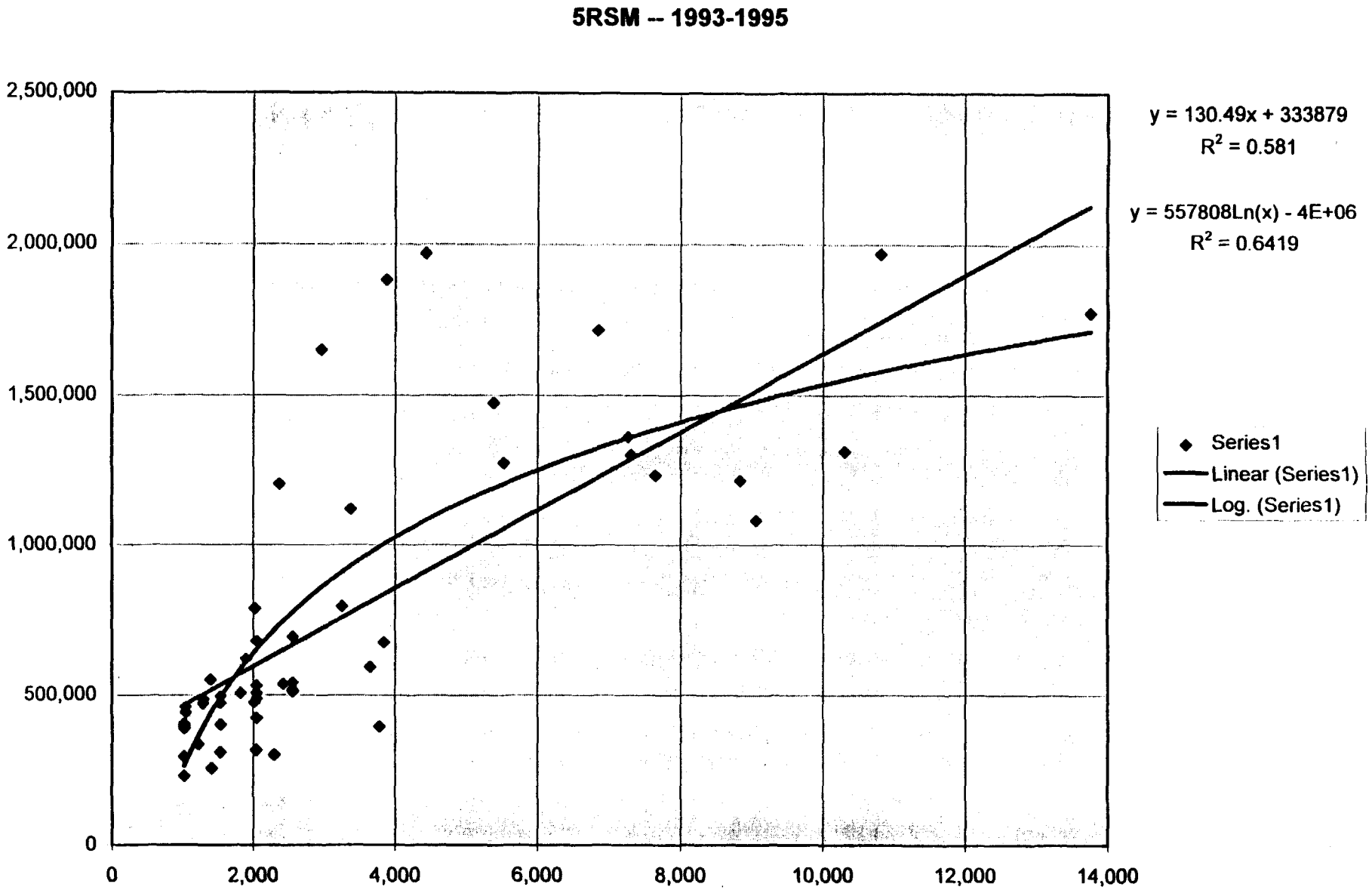
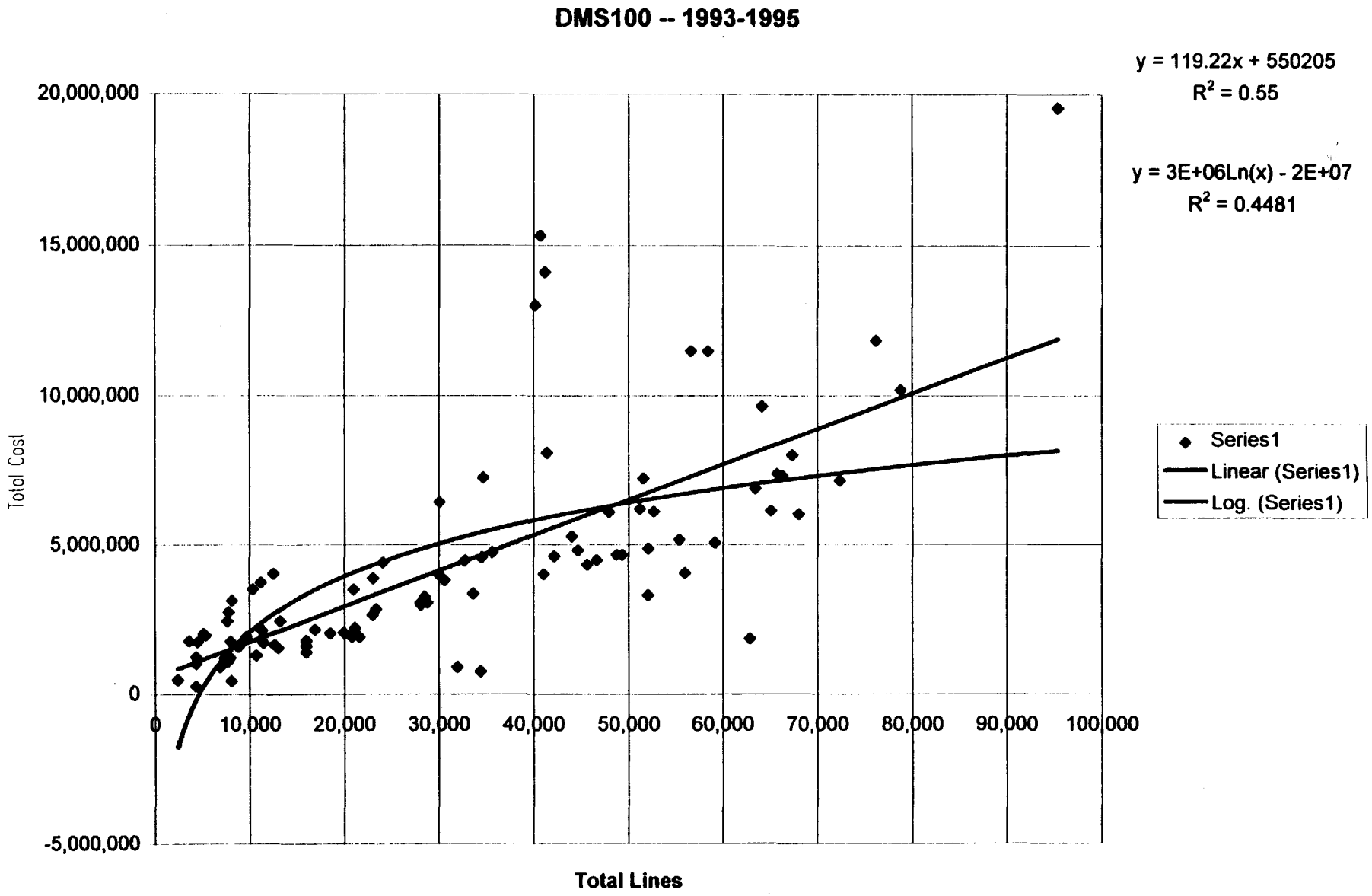
Attachment 1 – Switching Data from 1993 - 1995

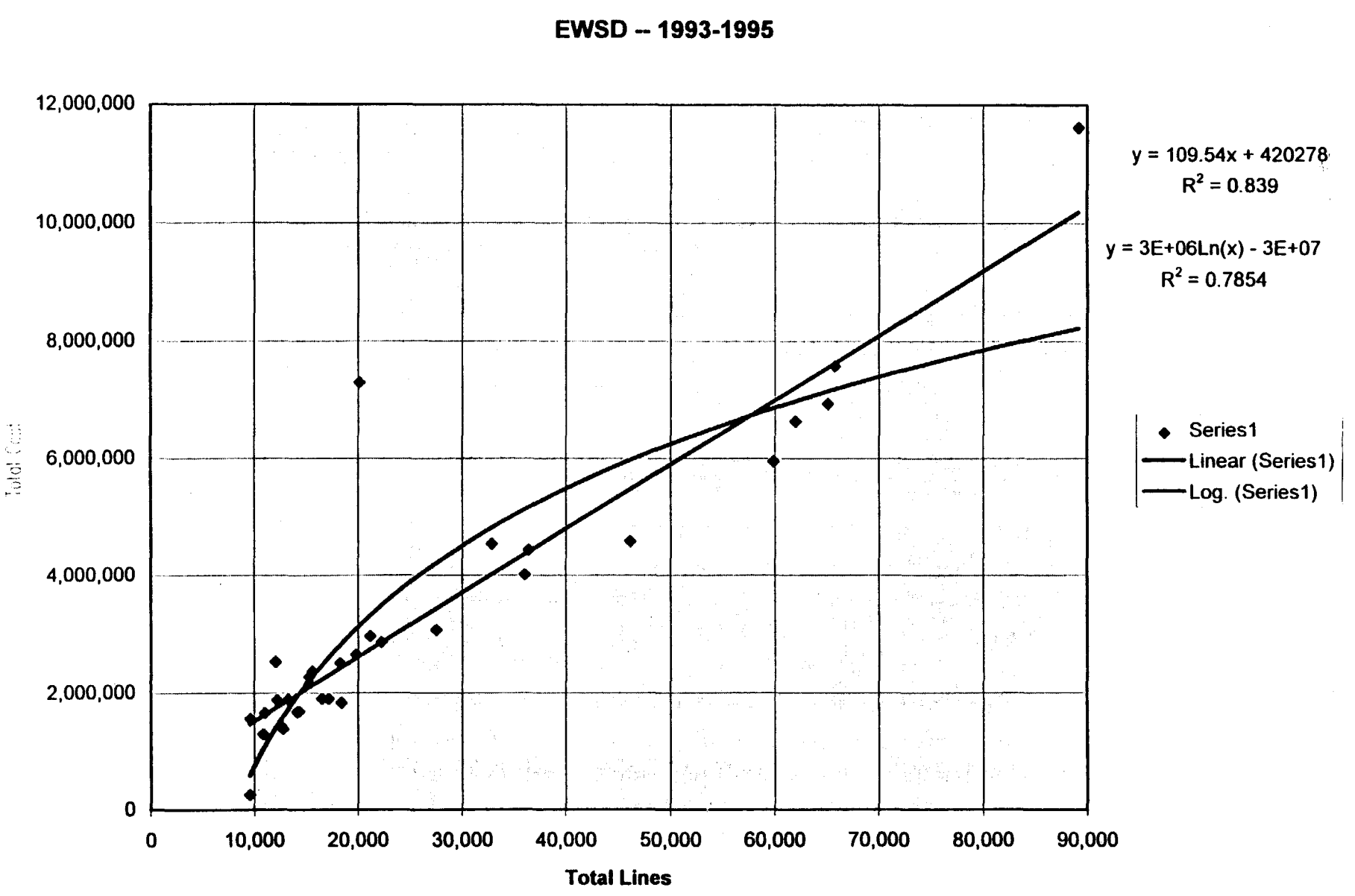

5ESS -- 1993-1995
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
0
20,000
40,000
60,000
80,000
100,000
120,000
Total Lines
y = 123.14x + 2E+06
R2 = 0.5511
y = 5E+06Ln(x) - 4E+07
R2 = 0.5227
Series1
Linear (Series1)
Log. (Series1)

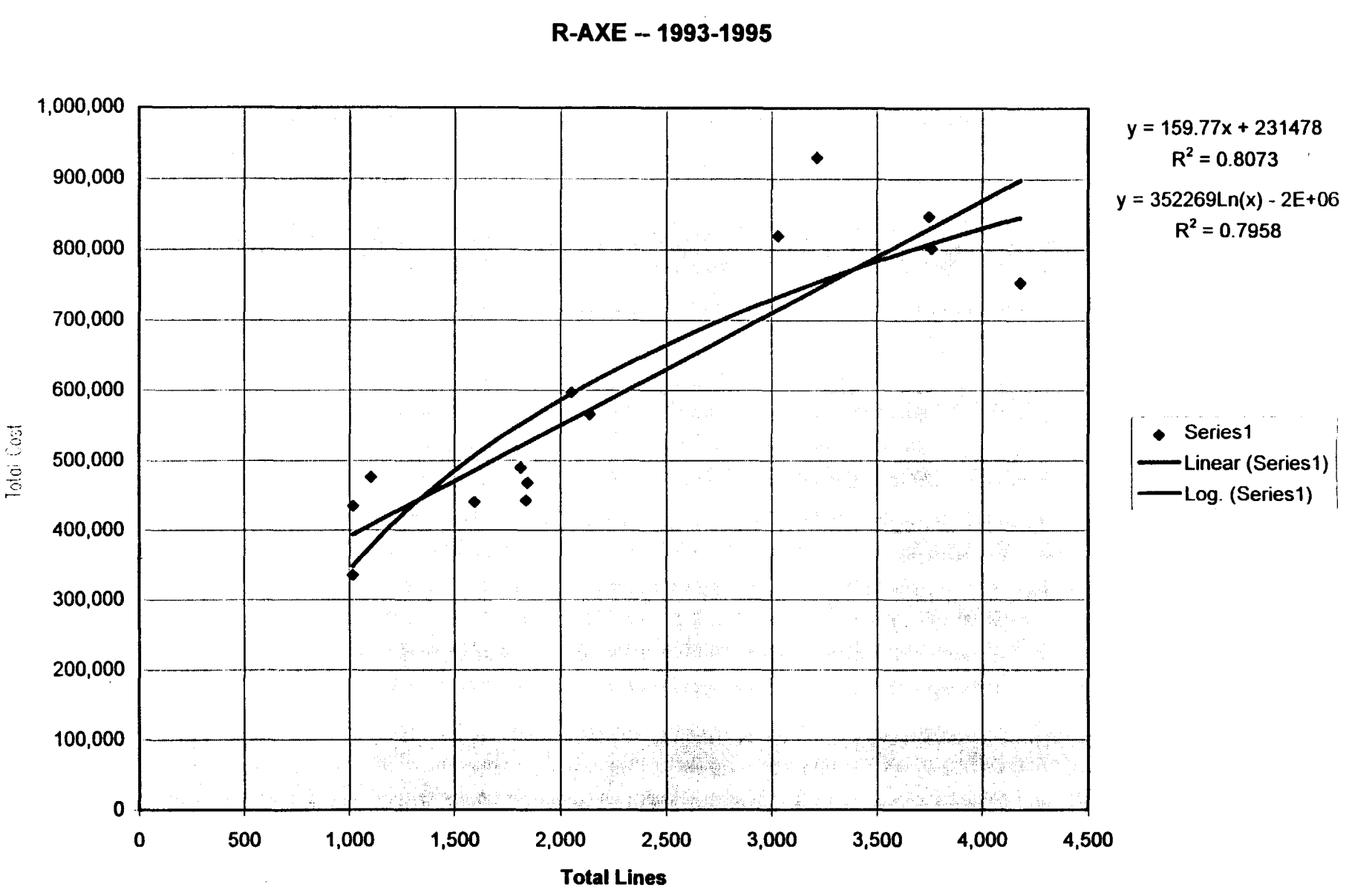

Small 5ESS -- 1993-1995
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
Total Cost
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
18,000
20,000
Total Lines
y = 123.86x + 980987
R2 = 0.1456
y = 1E+06Ln(x) - 9E+06
R2 = 0.1944
Series1
Linear (Series1)
Log. (Series1)

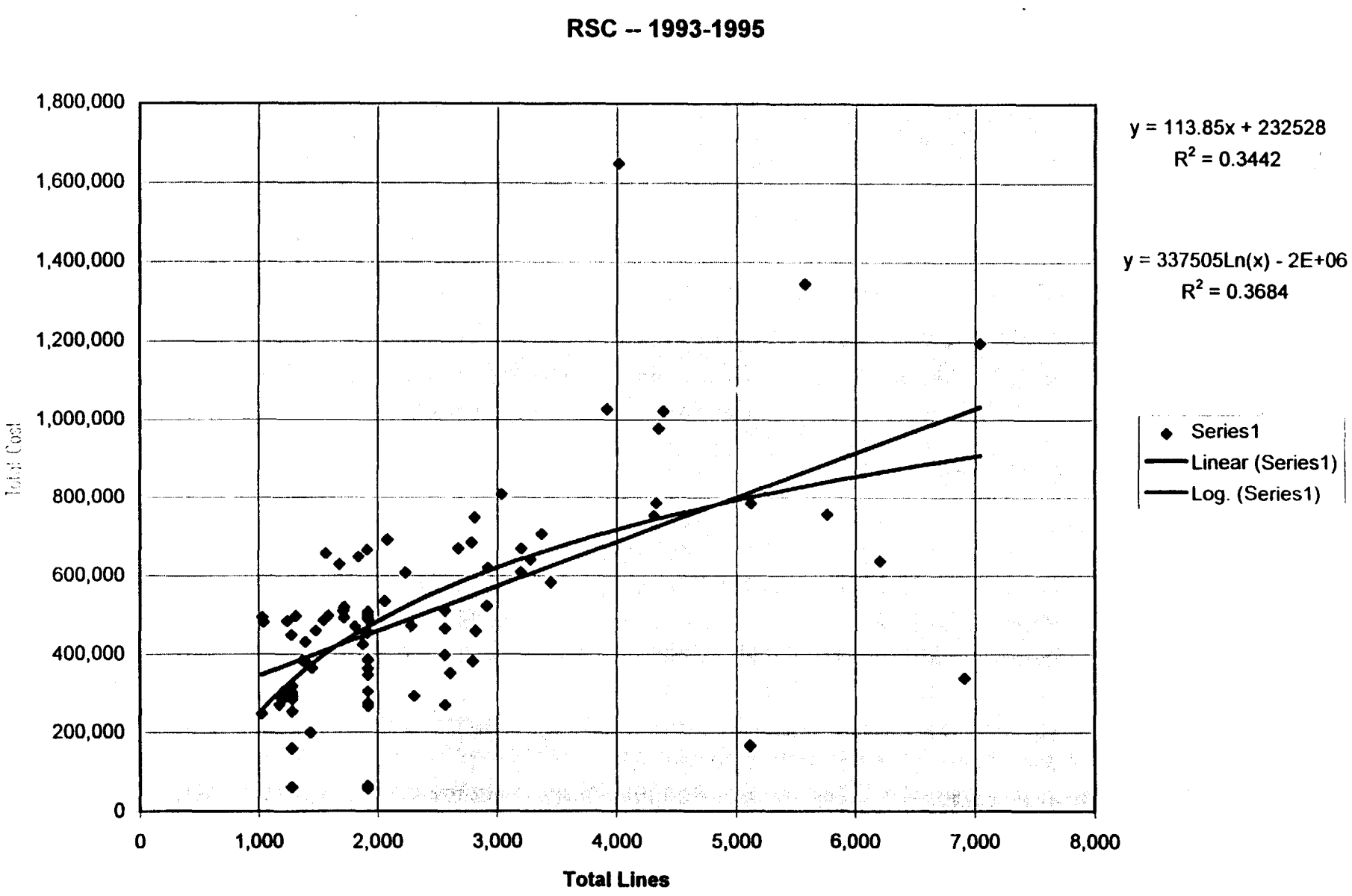

Medium 5ESS -- 1993-1995
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
0
0
5,000
10,000
15,000
20,000
25,000
30,000
35,000
40,000
45,000
50,000
Total Lines
y = 68.609x + 3E+06
R2 = 0.0741
y = 3E+06Ln(x) - 2E+07
R2 = 0.0861
Series1
Linear (Series1)
Log. (Series1)

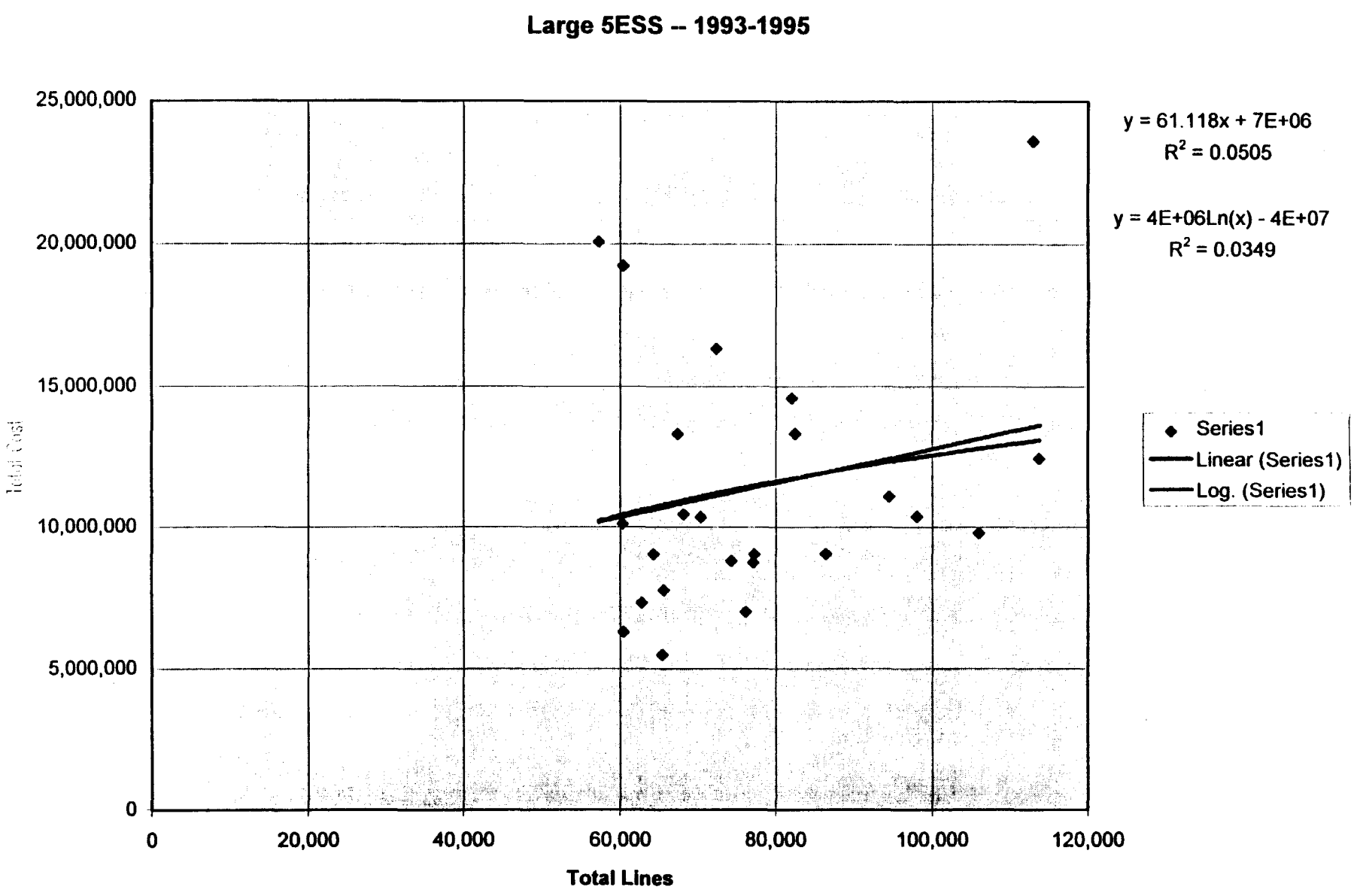

5RSM -- 1993-1995
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
y = 130.49x + 333879
R2 = 0.581
y = 557808Ln(x) - 4E+06
R2 = 0.6419
Series1
Linear (Series1)
Log. (Series1)


DMS100 -- 1993-1995
y = 119.22x + 550205
R² = 0.55
y = 3E+06Ln(x) - 2E+07
R² = 0.4481
20,000,000
15,000,000
10,000,000
5,000,000
0
-5,000,000
Total Cost
0
10,000
20,000
30,000
40,000
50,000
60,000
70,000
80,000
90,000
100,000
Total Lines
Series1
Linear (Series1)
Log. (Series1)


EWSD -- 1993-1995
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
0
0
10,000
20,000
30,000
40,000
50,000
60,000
70,000
80,000
90,000
Total Lines
y = 109.54x + 420278
R2 = 0.839
y = 3E+06Ln(x) - 3E+07
R2 = 0.7854
Series1
Linear (Series1)
Log. (Series1)


R-AXE -- 1993-1995
1,000,000
900,000
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
Total Cost
0
500
1,000
1,500
2,000
2,500
3,000
3,500
4,000
4,500
Total Lines
y = 159.77x + 231478
R² = 0.8073
y = 352269Ln(x) - 2E+06
R² = 0.7958
Series1
Linear (Series1)
Log. (Series1)


RSC -- 1993-1995
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
Total Cost
Total Lines
y = 113.85x + 232528
R2 = 0.3442
y = 337505Ln(x) - 2E+06
R2 = 0.3684
Series1
Linear (Series1)
Log. (Series1)


Large 5ESS -- 1993-1995
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
0
20,000
40,000
60,000
80,000
100,000
120,000
Total Lines
y = 61.118x + 7E+06
R2 = 0.0505
y = 4E+06Ln(x) - 4E+07
R2 = 0.0349
Series1
Linear (Series1)
Log. (Series1)

Attachment 2 – Switching Data from 1993 - 1995

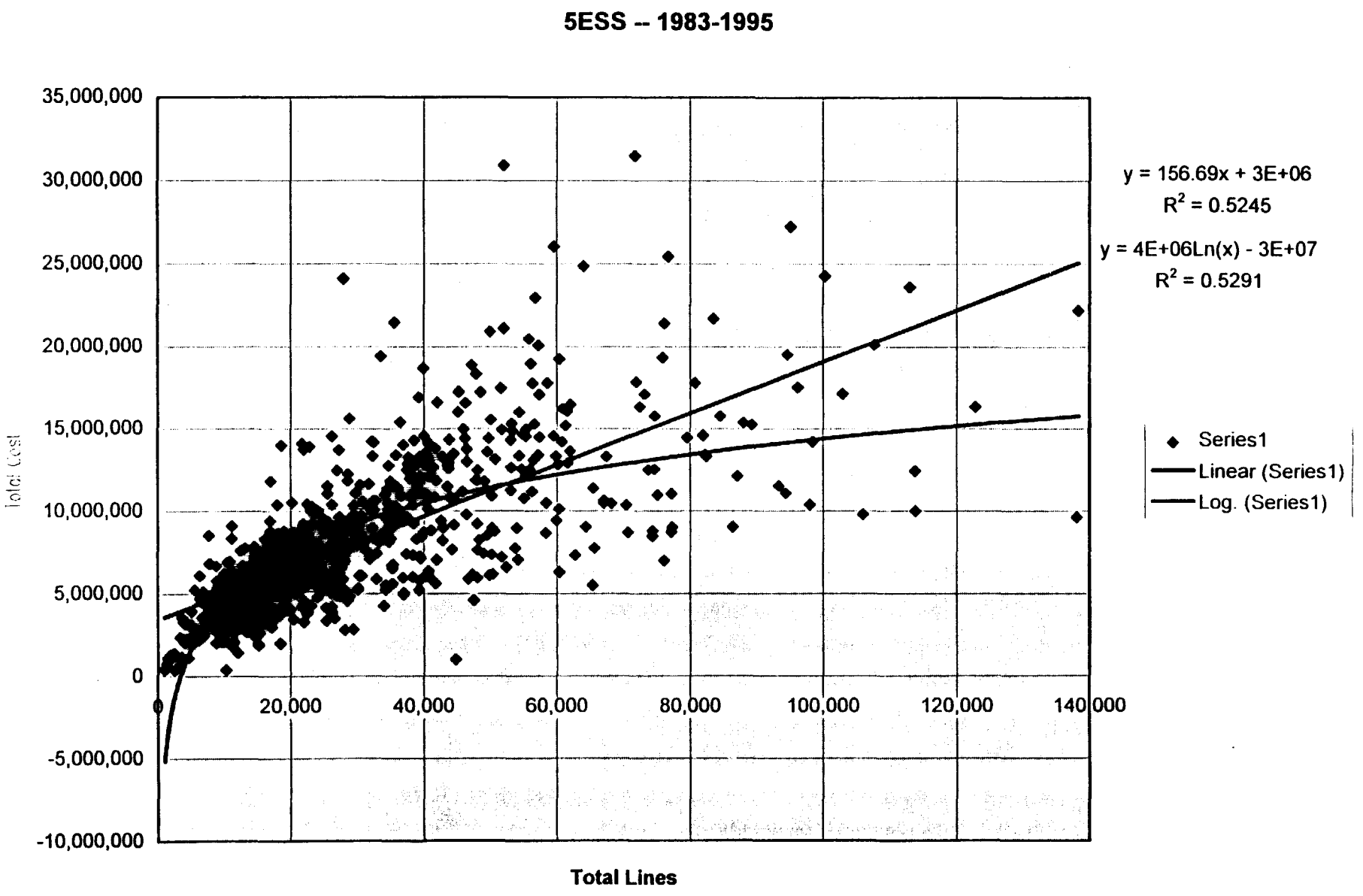
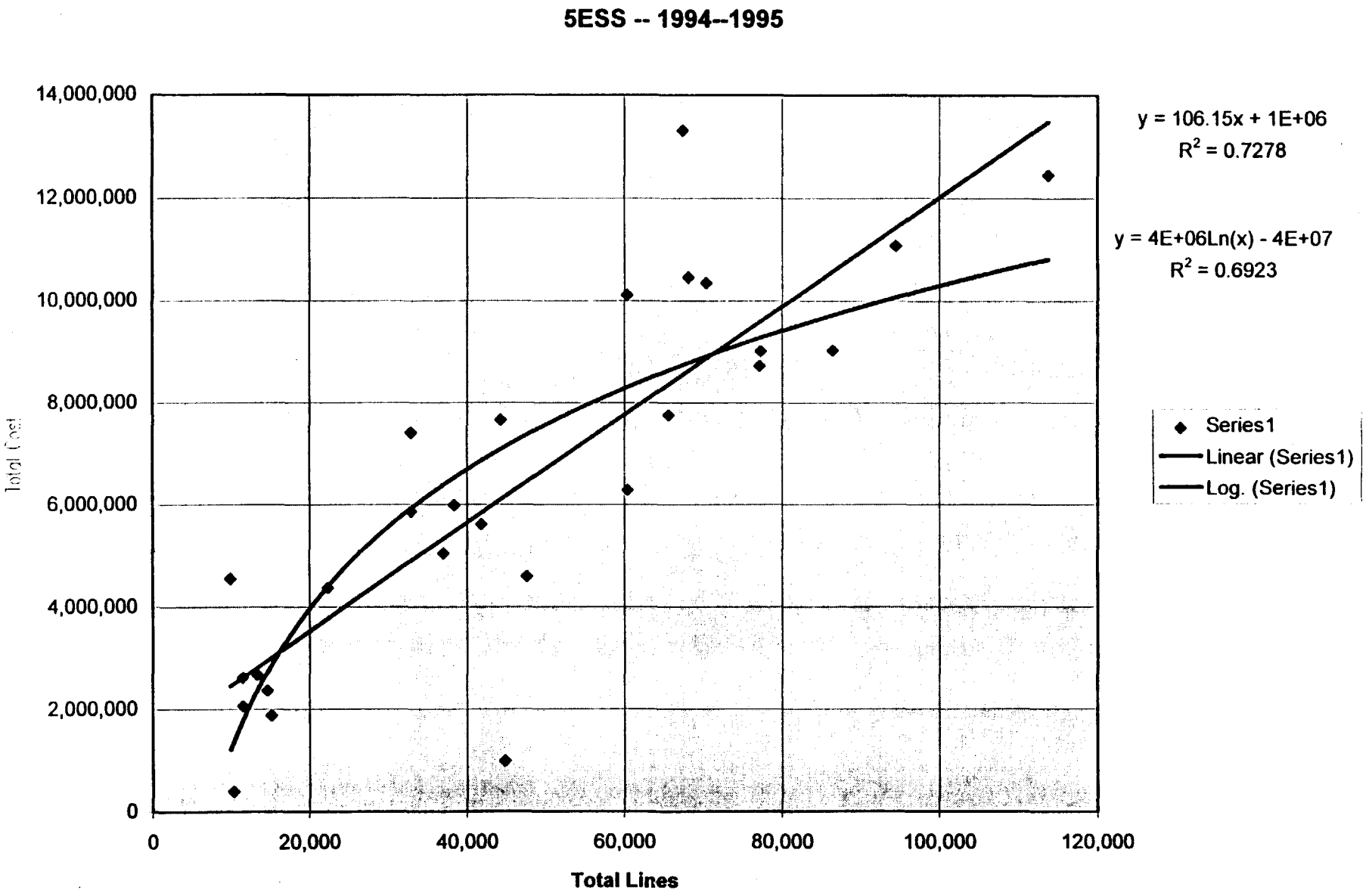

5ESS -- 1983-1995
35,000,000
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
-5,000,000
-10,000,000
0
20,000
40,000
60,000
80,000
100,000
120,000
140,000
Total Cost
Total Lines
y = 156.69x + 3E+06
R2 = 0.5245
y = 4E+06Ln(x) - 3E+07
R2 = 0.5291
Series1
Linear (Series1)
Log. (Series1)

Chart2


5ESS -- 1994--1995
14,000,000
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
0
0
20,000
40,000
60,000
80,000
100,000
120,000
Total Lines
y = 106.15x + 1E+06
R2 = 0.7278
y = 4E+06Ln(x) - 4E+07
R2 = 0.6923
Series1
Linear (Series1)
Log. (Series1)

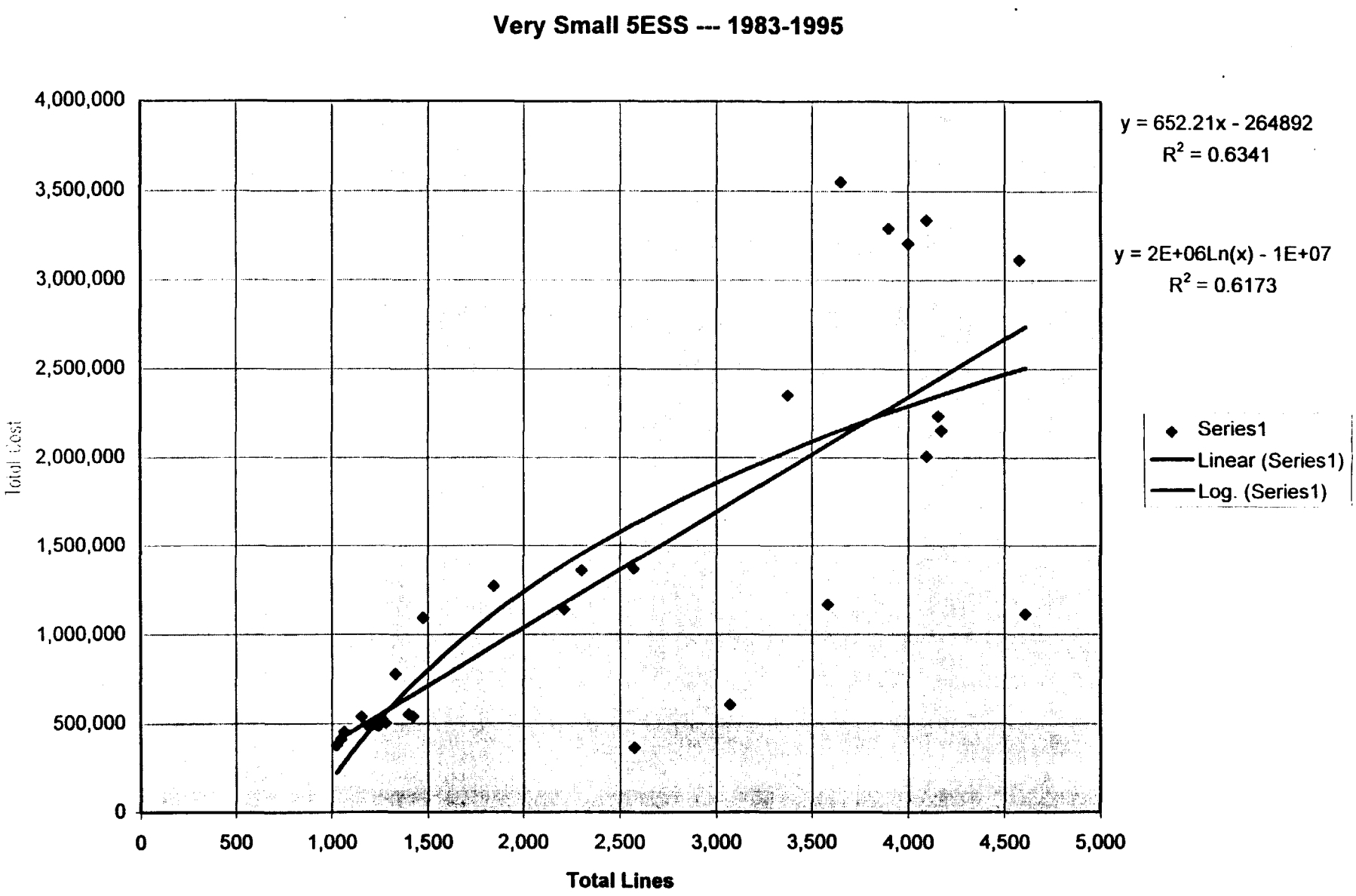
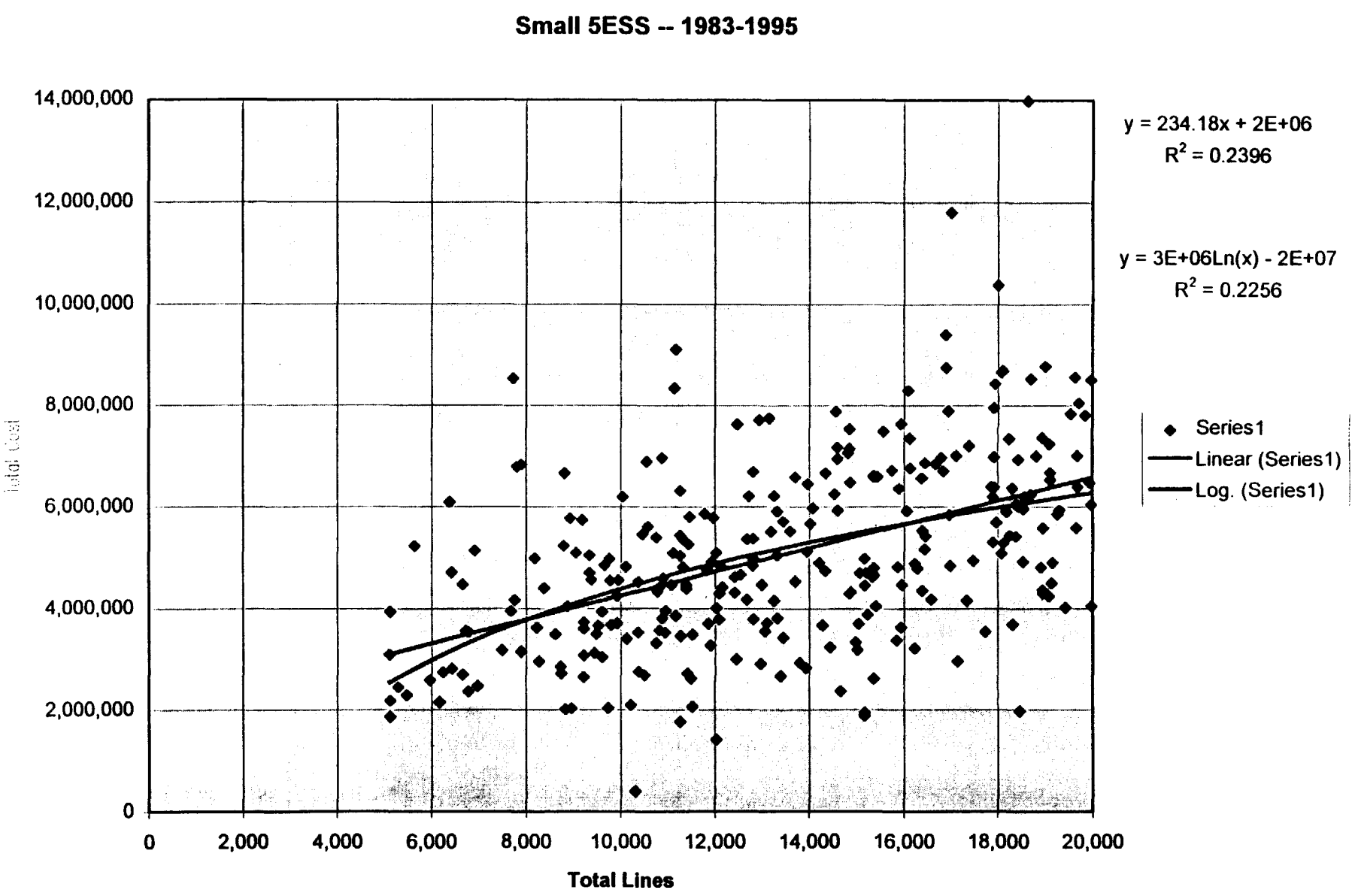
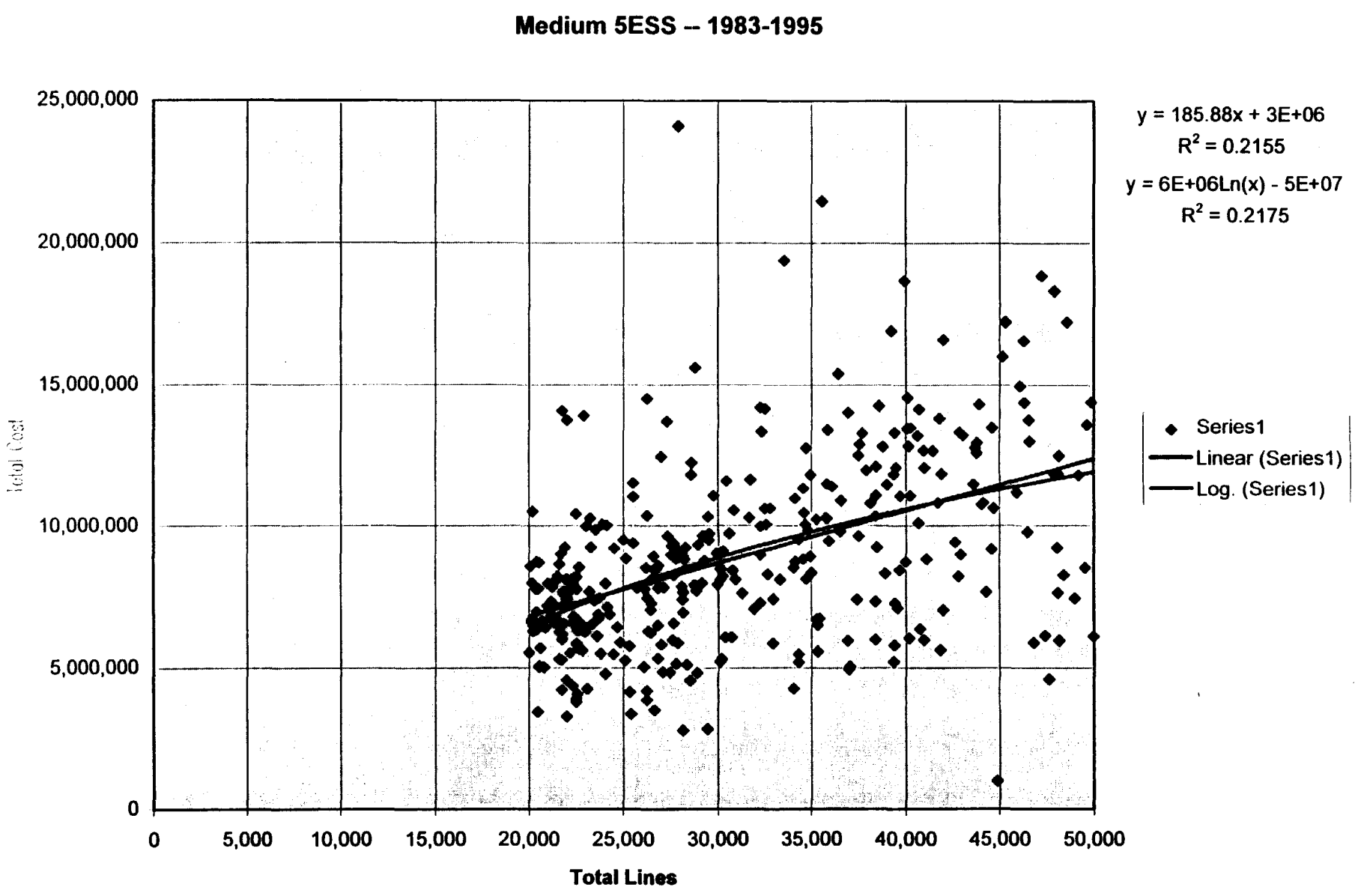
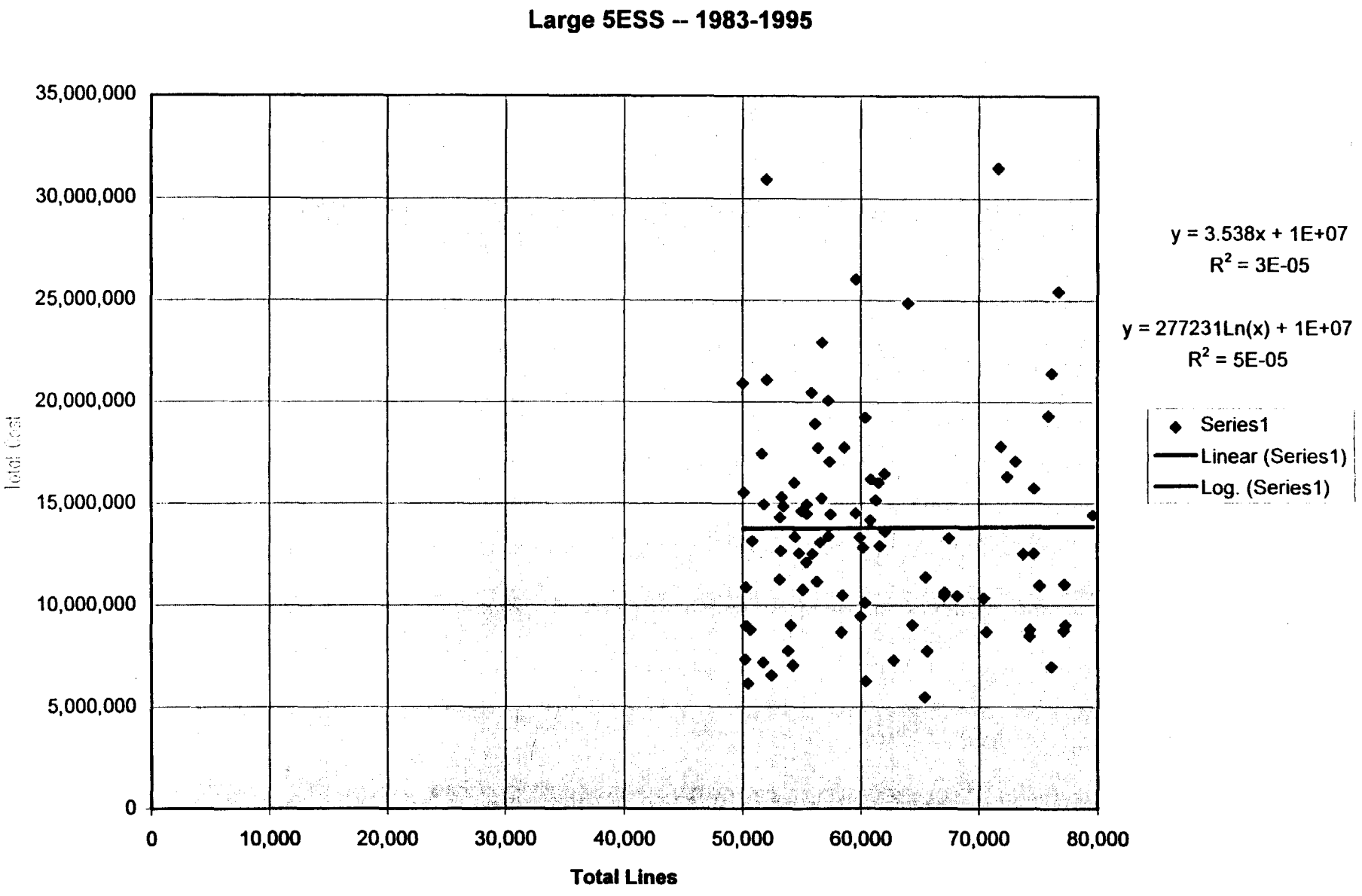

Very Small 5ESS --- 1983-1995
4,000,000
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
Total Cost
0
500
1,000
1,500
2,000
2,500
3,000
3,500
4,000
4,500
5,000
Total Lines
y = 652.21x - 264892
R2 = 0.6341
y = 2E+06Ln(x) - 1E+07
R2 = 0.6173
Series1
Linear (Series1)
Log. (Series1)

Chart4


Small 5ESS -- 1983-1995
14,000,000
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
0
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
18,000
20,000
Total Lines
y = 234.18x + 2E+06
R2 = 0.2396
y = 3E+06Ln(x) - 2E+07
R2 = 0.2256
Series1
Linear (Series1)
Log. (Series1)


Medium 5ESS -- 1983-1995
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
Total Cost
0
5,000
10,000
15,000
20,000
25,000
30,000
35,000
40,000
45,000
50,000
Total Lines
y = 185.88x + 3E+06
R2 = 0.2155
y = 6E+06Ln(x) - 5E+07
R2 = 0.2175
Series1
Linear (Series1)
Log. (Series1)


Large 5ESS -- 1983-1995
35,000,000
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
Total Cost
0
10,000
20,000
30,000
40,000
50,000
60,000
70,000
80,000
Total Lines
y = 3.538x + 1E+07
R2 = 3E-05
y = 277231Ln(x) + 1E+07
R2 = 5E-05
Series1
Linear (Series1)
Log. (Series1)

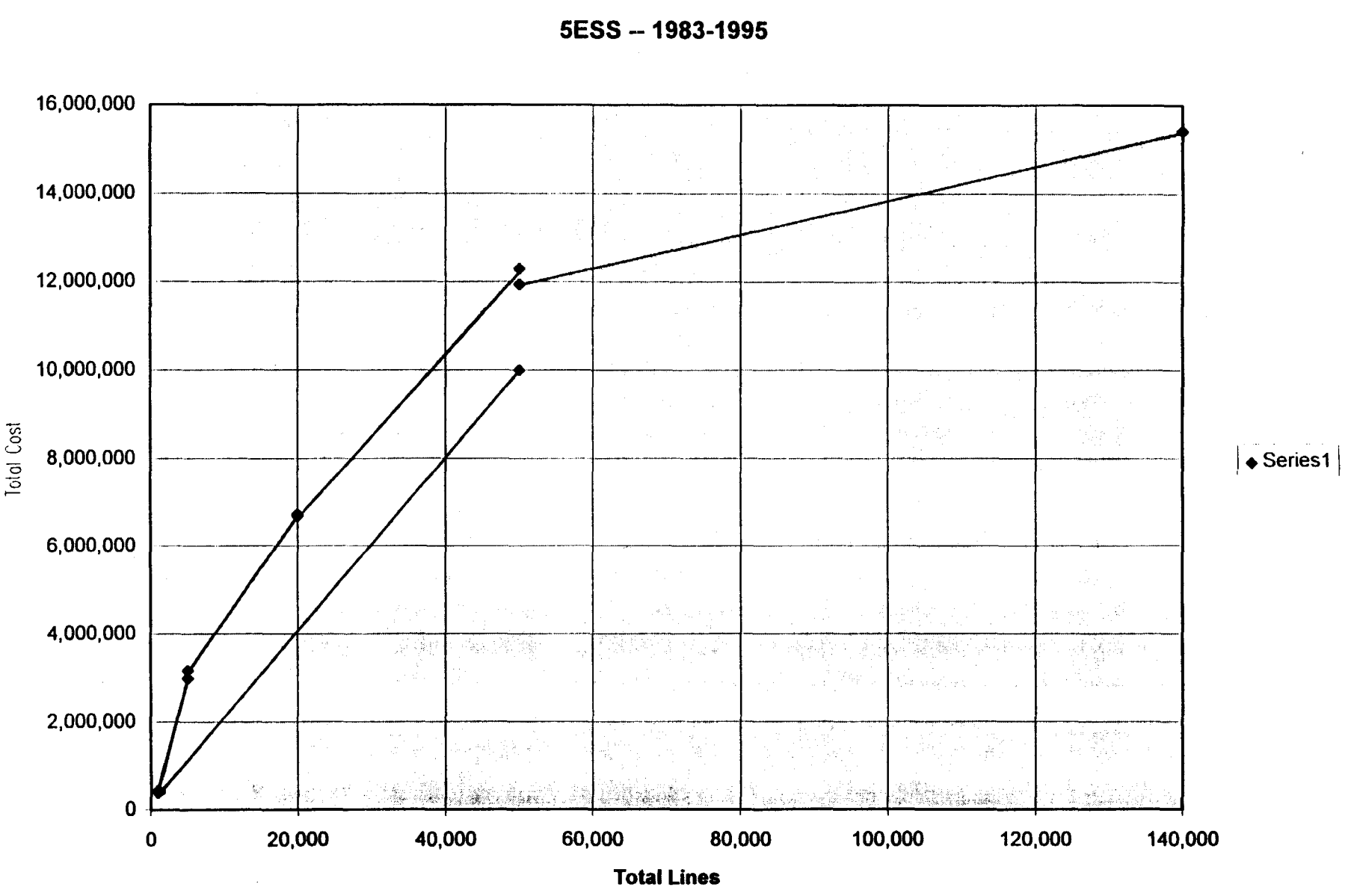
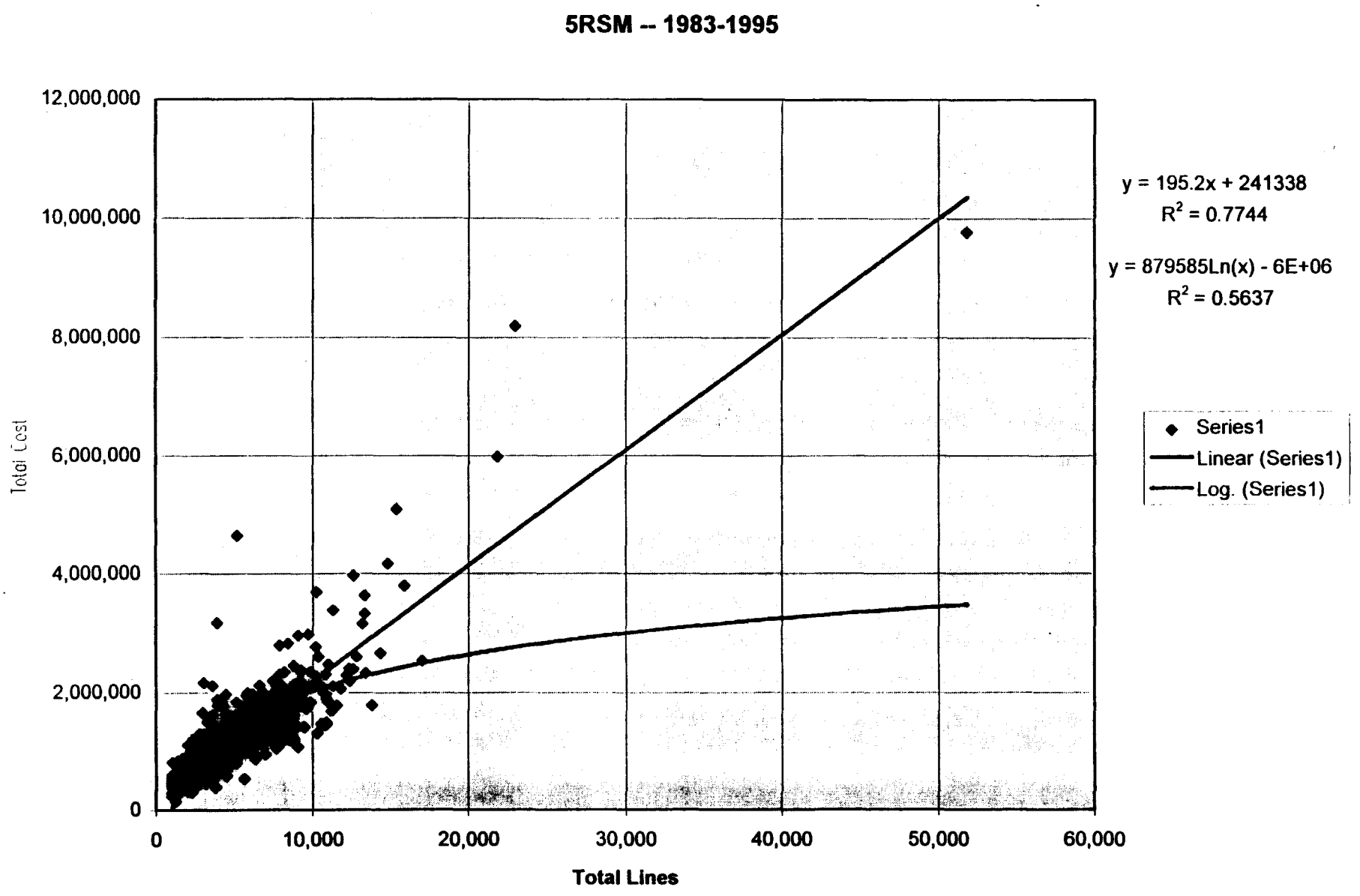

5ESS -- 1983-1995
16,000,000
14,000,000
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
0
Total Cost
0
20,000
40,000
60,000
80,000
100,000
120,000
140,000
Total Lines
Series1

Chart8


5RSM -- 1983-1995
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
0
Total Cost
0
10,000
20,000
30,000
40,000
50,000
60,000
Total Lines
y = 195.2x + 241338
R2 = 0.7744
y = 879585Ln(x) - 6E+06
R2 = 0.5637
Series1
Linear (Series1)
Log. (Series1)